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ISO TC 184/SC4 QUALITY COMMITTEE DOCUMENT

Technical Committee 184 for Industrial Automation Systems and Integration

Subcommittee 4 for Industrial Data

TC 184/SC4 Quality Handbook

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TC 184/SC4 Quality Handbook

1. Introduction

The Quality Committee has responsibility for establishing a quality system for SC4 that enables development of quality standards. Quality goals for SC4 include

— the overall consistency of standards products of SC4 and components of these standards;

— the completeness of each standards product of SC4; and

— the understandability of each standards product of SC4 by those who review the technical content of the standard, implement the standard in software products, and test implementations of the standard.

This handbook is the cornerstone of the SC4 quality system. This handbook calls out the specifications, quality assessment criteria, and approval procedures that support built-in quality for all SC4 standards products. This handbook is intended to be used as a guide in the development of standards products.

1.1 Objectives

The objectives of the SC4 quality handbook are

— to provide SC4 projects with a stable document that enumerates the specifications, quality assessment criteria, and approval processes that are to be used to achieve quality standards;

— to ensure that tasks are done consistently within SC4;

— to provide a foundation for improvement of quality practices within SC4; and

— to provide objective evidence for determining and correcting the causes of poor quality.

1.2 Quality management versus quality assurance

In the development of any product, attention to quality is of foremost importance. This is equally important when the product is a standard. Lack of quality in a proposed standard impedes adequate technical review, allows for misinterpretation, and causes delays in the adoption of the standard. There are two places where attention to quality may be focused: 1) on the inspection of the product (i.e. a draft standard) at specific points in time during its development; and 2) on the development of the process, procedures, tools and techniques that instill quality in the development of standards.

The initial focus of review within SC4 has been on the first of these, the inspection of the parts of ISO 10303. The focus for the future is on the second, enabling quality part development, as well as on extending the scope of reviews to cover all standards products of SC4. Plans for transition between the two states are documented in the *ISO TC 184/SC4 Quality Committee Transition Plan* [QCN057].

The distinction between a focus on quality as a development activity and as an inspection activity can be viewed respectively as quality management and quality assurance. The first term, quality management, entails the existence of procedures and assessments to ensure that

the quality of the product results from the application of accepted product development methods. Quality assurance is a post-production or in-process inspection activity that may use the same assessments and criteria as above, but which is performed with a different set of procedures. These procedures address only the evaluation of a product as opposed to providing product development procedures for all aspects of the development process.

1.3 SC4 part requirements

Whether quality assessment criteria are used as a development aid or as a quality inspection tool, the specification of requirements that shall be met by standards of SC4 for approval as an international standard is essential. The value of the quality system within SC4 depends upon

— the existence, acceptance, and dissemination of requirements for standards development;

— the understanding, practical application and consistent use of these requirements by standards developers.

Each class of part contains categories of material that are governed by different specifications and subject to different evaluations. Some categories of material, such as the scope, normative references, and definitions apply to all parts. SC4 parts may be divided into five categories:

— text parts (10303-1-30s, some parts of 13584, 15531, and 15926);

— integrated resource parts (ISO 10303-40s and 100s, 13584-20s, 15531-40s);

— application protocol parts (ISO 10303-200s);

— abstract test suite parts (ISO 10303-300s);

— application interpreted construct parts (ISO 10303-500s).

Each class of part has some elements that have measurable criteria. The requirements may differ depending on the class of part and the intent of the element within the part class.

Development details for a particular class of part are documented in the various SC4 Standing Document referenced in the class-specific clauses. These standing documents are used by the project teams to develop correct parts and by the Quality Committee to derive the quality assessment criteria used in the evaluation of SC4 parts. The standing documents are accepted and modified by SC4 resolution.

The quality assessment criteria that are used to evaluate each class of part are documented in *Procedures for internal review* (QCN054). *Procedures for Internal Review* is intended to provide a comprehensive set of quality criteria organized to direct the assessment of a part. It is envisioned that these procedures will be continuously improved through feedback from its users.

2. Scope

This scope of this document includes all of the SC4 standards

ISO 10303	STEP
ISO 13584	PLIB

ISO 15531	MANDATE
ISO 15926	Oil & Gas

This document presents the elements required to assess the quality of an SC4 part and to specify the improvements that should be made to the part prior to its release by SC4 for balloting.

The following are within the scope of this document:

— identification of sources of specifications for the development of the various portions of the SC4 parts;

— identification of sources of quality assessment criteria that may be used to verify the technical consistency of a part, the format and structure of the part document, the clarity of ideas, definitions, examples, graphical models and illustrations, and the correctness of technical elements such as usage and syntax of EXPRESS and IDEF0;

— identification of documented procedures governing the review and approval of the above standards;

— identification of references to checklists for use in review of different parts of each of the above standards.

The following are outside the scope of this document:

— part development integration and interpretation procedures;

— assessment criteria for evaluation of the accuracy or technical content of a part;

— definition of requirements that shall be met by SC4 standards;

NOTE - The requirements for parts are derived from accepted documents within SC4. Clauses 4-8 list the primary references that contain these requirements.

— the part development, integration, or interpretation procedures used within SC4;

— the overall procedures for the development and approval process within SC4.

3. Definitions and abbreviations

3.1 Definitions from 10303-1

This document makes use of the following terms defined in ISO 10303-1.

— abstract test suite (ATS);

— application activity model (AAM);

— application interpreted construct (AIC);

— application interpreted model (AIM);

— application protocol (AP);

— application reference model (ARM);

— integrated resource (IR).

3.2 Definitions from 10303-202

This document makes use of the following terms defined in ISO 10303-202.

— application interpreted construct (AIC).

3.3 Other definitions

For the purposes of this document, the following definitions apply.

3.3.1 quality: the totality of features and characteristics of a product or service that bears upon its ability to satisfy stated or implied needs. [ISO8042]

3.3.2 quality assurance: the collection of actions that give confidence to the customer that the quality policy has been achieved. Quality assurance has two main parts: the quality of the organization (using ISO 9000) and the quality of the products and the services (using product quality standards)

3.3.3 quality control: the management of the level of defects which occur as a result of some process. Measure a sample of the output for conformance to the specification for that stage of the process. Measurements may be numerical (quantitative) or comparative (qualitative).

3.3.4 specification: description of the features that are relevant to customer satisfaction, and that are relevant to the intended purpose. A defect is a feature that does not conform to the specification. The implications are that the feature can be measured and a reliable test method exists.

4. Integrated resources

This class includes the 40- and 100-series parts of ISO 10303, the 20-series parts of 13584, and the 40-series parts of 15531.

4.1 Specifications

In order to develop a high-quality integrated resource, the part editors must read, understand and apply

— *Oxford English Dictionary* [OED];

— *ISO/IEC Directives, Part 3* [IDP3]; and

— *Supplementary directives for the drafting and presentation of ISO 10303* [SC4N537];

The project development team must read and apply in the development of the integrated resource

— *Description methods: The EXPRESS language reference manual* [ISO10303-11]; and

— *EXPRESS usage guide* [WG5N32].

4.2 Review criteria

General information on part reviews is found in *SC4 part review procedure* [QCN007].

Project development team verifies that the document meets the above specifications using *SC4 quality process manual* [QCN052], and *Procedures for internal review* [QCN054].

4.3 Approval

Project leader verifies that the document meets the above specifications using *the Project leader approval checklist for ISO 10303* [QCN025].

Convener verifies that the document meets the above specifications using *the Conveners approval checklist for ISO 10303* [QCN024].

Quality Committee Production Support team provides final sign-off.

5. Application protocols

This class includes the 200-series parts of ISO 10303.

5.1 Specifications

In order to develop a high-quality application protocol, the part editors must read, understand and apply

— *Oxford English Dictionary* [OED];

— *ISO/IEC Directives, Part 3* [IDP3]; and

— *Supplementary directives for the drafting and presentation of ISO 10303* [SC4N537];

The project development team must read and apply in the development of the various sections of an application protocol

— *Guidelines for the development and approval of STEP application protocols* [SC4N535];

— *Description methods: The EXPRESS language reference manual* [ISO10303-11];

— *Integration Definition for Information Modeling (IDEF1X)* [FIPS184];

— *Integration Definition for Function Modeling (IDEF0)* [FIPS183];

— *Guidelines for the development of mapping tables* [SC4N533];

— *Guidelines for application interpreted model development* [SC4N532];

— *Procedures for application interpretation* [QCN027];

— *Conformance testing methodology and framework: General concepts* [ISO10303-31]; and

— *Conformance testing methodology and framework: Requirements on testing laboratories and clients* [ISO10303-32].

If application interpreted constructs are to be used in the documentation of the application protocol, also read and apply

— *Guidelines for application interpreted construct development* [SC4N534].

5.2 Review criteria

General information on part reviews is found in *SC4 part review procedure* [QCN007].

Project development team verifies that the document meets the above specifications using *SC4 quality process manual* [QCN052], and *Procedures for internal review* [QCN054].

5.3 Approval

Project leader verifies that the document meets the above specifications using *the Project leader approval checklist for ISO 10303* [QCN025].

Convener verifies that the document meets the above specifications using *the Conveners approval checklist for ISO 10303* [QCN024].

Quality Committee Production Support team provides final sign-off.

6. Abstract test suites

This class includes the 300-series parts of ISO 10303.

6.1 Specifications

In order to develop a high-quality abstract test suite, the part editors must read, understand and apply

— *Oxford English Dictionary* [OED];

— *ISO/IEC Directives, Part 3* [IDP3]; and

— *Supplementary directives for the drafting and presentation of ISO 10303* [SC4N537];

The project development team must read and apply in the development of the various sections of an abstract test suite

— *Guidelines for the development of abstract test suites* [SC4N536];

— *Conformance testing methodology and framework: General concepts* [ISO10303-31]; and

— *Conformance testing methodology and framework: Requirements on testing laboratories and clients* [ISO10303-32].

If the ATS uses physical files for specifying test cases, also read and apply

— *Implementation methods: Clear text encoding of the exchange structure* [ISO10303-21].

If the ATS uses EXPRESS-I for describing test cases, also read and apply

— *Description methods: The EXPRESS-I language reference manual* [ISO10303-12].

If the ATS references SDAI as an implementation form, also read and apply

— *Conformance testing methodology and framework: Abstract test methods for SDAI implementations* [ISO10303-35].

6.2 Review criteria

General information on part reviews is found in *SC4 part review procedure* [QCN007].

Project development team verifies that the document meets the above specifications using *SC4 quality process manual* [QCN052], and *Procedures for internal review* [QCN054].

6.3 Approval

Project leader verifies that the document meets the above specifications using *the Project leader approval checklist for ISO 10303* [QCN025].

Convener verifies that the document meets the above specifications using *the Conveners approval checklist for ISO 10303* [QCN024].

Quality Committee Production Support team provides final sign-off.

7. Application interpreted constructs

This class includes the 500-series parts of ISO 10303.

7.1 Specifications

In order to develop a high-quality application integrated construct, the part editors must read, understand and apply

— *Oxford English Dictionary* [OED];

— *ISO/IEC Directives, Part 3* [IDP3]; and

— *Supplementary directives for the drafting and presentation of ISO 10303* [SC4N537];

The project development team must read and apply in the development of the various sections of an application interpreted construct

— *Guidelines for the development of application interpreted constructs* [SC4N534];

— *Description methods: The EXPRESS language reference manual* [ISO10303-11];

— *Guidelines for application interpreted model development* [SC4N532]; and

— *Procedures for application interpretation* [QCN027].

If any components of an ATS are to be included in the documentation of the AIC, also read and apply

— *Guidelines for the development of abstract test suites* [SC4N536].

7.2 Review criteria

General information on part reviews is found in *SC4 part review procedure* [QCN007].

Project development team verifies that the document meets the above specifications using *SC4 quality process manual* [QCN052], and *Procedures for internal review* [QCN054].

7.3 Approval

Project leader verifies that the document meets the above specifications using *the Project leader approval checklist for ISO 10303* [QCN025].

Convener verifies that the document meets the above specifications using *the Conveners approval checklist for ISO 10303* [QCN024].

Quality Committee Production Support team provides final sign-off.

8. Text parts

This class includes the 1-30-series parts of ISO 10303, as well as parts of ISO 13584, ISO 15531, and ISO 15926.

8.1 Specifications

In order to develop a high-quality standard, the part editors must read, understand, and apply

— *Oxford English Dictionary* [OED];

— *ISO/IEC Directives, Part 3* [IDP3]; and

— *Supplementary directives for the drafting and presentation of ISO 10303* [SC4N537];

Additionally the project development team must read and apply in the development of the parts any of the following that are applicable.

If the part includes EXPRESS, also read and apply

— *Description methods: The EXPRESS language reference manual* [ISO10303-11].

If the part includes physical files, also read and apply

— *Implementation methods: Clear text encoding of the exchange structure* [ISO10303-21].

If the part is related to conformance testing and abstract test suite specification, also read and apply

— *Guidelines for the development of abstract test suites* [SC4N536].

NOTE - There are no specific methods documents that apply to these standards. As specific methods become available they shall be referenced.

8.2 Review criteria

General information on part reviews is found in *SC4 part review procedure* [QCN007].

Project development team verifies that the document meets the above specifications using *SC4 quality process manual* [QCN052], and *Procedures for internal review* [QCN054].

8.3 Approval

Project leader verifies that the document meets the above specifications using *the Project leader approval checklist for ISO 10303* [QCN025], unless the part is a part of ISO 15926, in which case, Project leader verifies that the document meets the above specifications using *the ISO 15926 quality checklist* [QCN051].

Convener verifies that the document meets the above specifications using *the Conveners approval checklist for ISO 10303* [QCN024].

Quality Committee Production Support team provides final sign-off.

Annex A

References

[FIPS183] Federal Information Processing Standard Publication 183, *Integration Definition for Function Modeling (IDEF0)*, FIPS PUB 183, National Institute of Standards and Technology, December 1993.

[FIPS184] Federal Information Processing Standard Publication 184, *Integration Definition for Information Modeling (IDEF1X)*, FIPS PUB 184, National Institute of Standards and Technology, December 1993.

[IDP-3] *ISO/IEC Directives, Part 3, Rules for the structure and drafting of International Standards*, Third edition, 1997.

[ISO8042] ISO 8042:1996, *Quality vocabulary*

[ISO9000-1] ISO 9000-1:1994, *Quality management and quality assurance standards ¾ Part 1: Guidelines for selection and use*

[ISO9004-1] ISO 9004-1:1994, *Quality management and quality system elements ¾ Part 1: Guidelines*

[ISO10303-11] ISO 10303-11:1994, *Description methods: The EXPRESS language reference manual*

[ISO10303-12] ISO 10303-12, *Description methods: The EXPRESS-I language reference manual*

[ISO10303-21] ISO 10303-21:1994, *Implementation methods: Clear text encoding of the exchange structure*

[ISO10303-31] ISO 10303-31:1994, *Conformance testing methodology and framework: General concepts*

[ISO10303-32] ISO 10303-32, *Conformance testing methodology and framework: Requirements on testing laboratories and clients*

[ISO10303-35] ISO 10303-35, *Conformance testing methodology and framework: Abstract test methods for SDAI implementations*

[OED] *Oxford English Dictionary*

[QCN007] ISO TC 184/SC4/QC N007:1996, *SC4 Part Review Procedure*, 1996/08/15

[QCN024] ISO TC 184/SC4/QC N024:1997, *Conveners Approval Check List for ISO 10303*

[QCN025] ISO TC 184/SC4/QC N025:1997, *Project Leader Approval Check List for ISO 10303*

[QCN027] ISO TC 184/SC4/QC N027:1997, *Procedures for application interpretation*

[QCN051] ISO TC 184/SC4/QC N051:1998, *ISO 15926 quality checklist*

[QCN052] ISO TC 184/SC4/QC N052:1998, *SC4 quality process manual*

[QCN054] ISO TC 184/SC4/QC N054:1998, *SC4 procedures for internal review*

[QCN057] ISO TC 184/SC4/QC N056:1998, *ISO TC 184/SC4 Quality Committee transition plan*

[SC4N369] ISO TC 184/SC4 N369:1995, *STEP Application Protocol Qualification Manual*

[SC4N370] ISO TC 184/SC4 N370:1995, *STEP Part Qualification Procedure*

[SC4N532] ISO/TC 184/SC4 N532:1997, *Guidelines for application interpreted model development.*

[SC4N533] ISO/TC 184/SC4 N533:1997, *Guidelines for the development of mapping tables.*

[SC4N534] ISO/TC 184/SC4 N534:1997, *Guidelines for application interpreted construct development.*

[SC4N535] ISO/TC 184/SC4 N535:1998, *Guidelines for the development and approval of STEP application protocols.*

[SC4N536] ISO/TC 184/SC4 N536:1997, *Guidelines for the development of abstract test suites.*

[SC4N537] ISO/TC 184/SC4 N537:1997, *Supplementary directives for the drafting and presentation of ISO 10303.*

[SC4N679] ISO TC 184/SC4 N679:1998, *ISO TC 184/SC4 organization handbook.*

[WG5N32] ISO TC 184/SC4/WG5 N32:1992, *EXPRESS usage guide*